

Appl. No. : 10/815,907
Appellant : Brian Lee Lawrence et al.
Filed : 31 March 2004
Title : Tunable Laser
TC/A.U. : 2828
Examiner : Tod Thomas Van Roy

Docket No. : 139955-1
Customer No. : 6147

Commissioner for Patents
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PRE-APPEAL BRIEF REQUEST FOR REVIEW

In accordance with the OG Notice of July 12, 2005, Appellant respectfully submits this Pre-Appeal Brief Request for Review. This Request is being filed concurrently with a Notice of Appeal.

In the Final Office Action mailed on May 24, 2007, the Examiner rejected claims 1-6, 8-15, and 23-28 and objected to claims 12-13 and 26-27. Because Appellant believes that the rejections and objections are improper, the present Pre-Appeal Brief request has been filed.

Claims 1-6, 8-15, and 23-25, and 28 were rejected under 35 USC 103 (a) as being unpatentable over Baer US5627849 in view of Matsumoto US6295305 and further in view of Rowe US5260953. Of these, Claims 1 and 23 are independent.

Claim 1 relates to an apparatus including a tunable laser cavity, and claim 23 relates to a tunable laser system. These claims recite (with emphasis):

1. An apparatus, comprising: a tunable laser cavity, wherein said laser cavity comprises at least three mirrors, at least one filter and a plurality of crystals, wherein said at least three mirrors are substantially arranged in a folded linear cavity lambda configuration, said at least one filter comprises a birefringent filter and an etalon, at least one of said plurality of crystals comprises a Coloquintide crystal, and at least one of said plurality of crystals comprises a nonlinear crystal, wherein said at least three mirrors, said at least one filter, and said plurality of crystals are configured for providing electromagnetic radiation of an approximately single frequency; and

23. A tunable laser system, comprising: ... at least three mirrors, substantially arranged in a folded linear cavity lambda configuration; ..., said laser source, said one or more crystals, said at least three mirrors and said one or more filters being configured such that said laser source is capable of producing electromagnetic radiation within a particular wavelength range, at least one of said two or more crystals being configured to alter one or more properties of said electromagnetic radiation, and at least one of said one or more filters being configured to filter at least a portion of the electromagnetic radiation altered by said two or more crystals, wherein the portion filtered is adjustable to tune the frequency of the electromagnetic radiation altered by said two or more crystals.

The subject matter of the present invention is tunable laser systems and apparatus including tunable laser systems, wherein the laser cavity is a folded linear cavity in a lambda configuration. The embodiments of the present invention as described in the instant specification are configured for approximately single frequency (approximately single mode) operation. Examples of embodiments configured for such operation (which may be used to facilitate the more general recitations of the systems in claims 1 and 23) are presented in paragraphs [0014] to [0020] and FIGs. 1 and 2.

The Examiner stated in the final office action that the claim language is not specific to single mode operation. Appellant respectfully disagrees. In the art, the term "single frequency operation" is synonymous with "single longitudinal mode operation". See e.g., Encyclopedia of Laser Physics and Technology (http://www.rp-photonics.com/single_frequency_operation.html,

http://www.rp-photonics.com/single_mode_operation.html). Therefore, an approximately single frequency operation is synonymous with approximately single longitudinal (axial) operation, which implies that other longitudinal modes have been essentially suppressed. The word "approximately" was not intended by Appellant to cover multi-mode operation.

Appellant notes that the Examiner has stated, in the Response to Arguments section of the Final Office Action, that Baer does not teach single mode operation and instead teaches lasing in two discrete modes. Therefore Baer's laser system does not meet the limitation of approximately single frequency as asserted by the Examiner and as recited in claim 1.

As discussed above, the Examiner acknowledges that Baer system is optimized for operation with two adjacent longitudinal modes, which is clearly not an approximately single frequency operation. Appellant's claim 1 discloses a tunable laser cavity configured for approximately single frequency operation. Appellant's claim 23 recites a tunable laser system where one or more filters being configured to filter at least a portion of the electromagnetic radiation altered by said two or more crystals. This, in one embodiment, enables approximately single frequency operation.

Matsumoto was cited, with respect to claims 1 and 23, as relating to a Colquirite crystal. Rowe was cited with respect to claims 1 and 23, as relating to frequency tunable systems. But unlike Baer, both Matsumoto and Rowe relate to single longitudinal mode (single frequency) operation.

Rowe describes ring cavity configurations which are not folded cavity configurations. A ring cavity is a traveling wave cavity with cavity dynamics very different from the standing-wave cavity provided by folded linear cavities. And Matsumoto does not appear to relate to a folded linear cavity lambda configuration.

In addressing obviousness determinations under 35 USC 103, the Supreme Court in *KSR International Co. v. Teleflex Inc.*, No. 04-1350 (April 30, 2007), reaffirmed many of its precedents relating to obviousness including its holding in *Graham v. John Deere Co.*, 383 U.S. 1 (1966). In *KSR*, the Court also reaffirmed that "a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art." *Id.* at 14. In this regard, the *KSR* court stated that "it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does ... because inventions in most, if not all,

instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known." *Id.* at 14-15. Furthermore, the *KSR* court did not diminish the requirement for objective evidence of obviousness. *Id.* at 14 ("To facilitate review, this analysis should be made explicit. See *In re Kahn*, 441 F.3d 977, 988 (CA Fed. 2006) ("[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness").

When prior art references require a selected combination to render obvious a subsequent invention, there must be some reason for the combination other than the hindsight gained from the invention itself, i.e., something in the prior art as a whole must suggest the desirability, and thus the obviousness, of making the combination. *Uniroyal Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 5 U.S.P.Q.2d 1434 (Fed. Cir. 1988).

Appellant respectfully submits that the Examiner has not shown objective evidence of a reason to modify or combine the cited references to reach the present claims. Appellant further submits that one of ordinary skill in the art would not have taken the teachings of Matsumoto or Rowe and combined them with Baer as they are optimized for different configurations. Matsumoto and Rowe configurations are optimized for single longitudinal mode operation, whereas the Baer configuration is optimized for multimode (at least two longitudinal modes) operation and optimized for providing amplitude stability. Further, Rowe teaches ring cavity configurations in contrast to the linear cavities of Matsumoto and Baer.

Further, with respect to claim 23, Baer describes polarization filters like Brewster plates but fails to teach wavelength/frequency filters because the system is configured for multimode (at least two longitudinal modes) operation. There is no express or implied suggestion in Baer or in Matsumoto or Rowe to modify Baer for single frequency operation. Therefore, the references fail to suggest the desirability and thus the obviousness of making the combination.

For the reasons discussed above with respect to claims 1 and 23, Appellant respectfully submits that claim 1, the claim 1 dependent claims (objected claims 12-13 and rejected claims 2-11 and 14-15), claim 23, and the claim 23 dependent claims (objected claims 26-27 and rejected claims 24-25 and 28) define subject matter which is allowable over Baer in view of Rowe and further in view of Matsumoto.

In summary, Appellant respectfully requests that the Panel instruct the Examiner to

withdraw the outstanding rejections and allow the pending claims.

Respectfully submitted,

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